having two quantum well structures, **one** stacked over [each] **the** other and each comprising a plurality of alternating barrier layers and well layers, each well layer of each quantum well structure coupled between two barrier layers to support an intersubband transition between a bound ground energy state and an excited energy state within a common energy band where said excited energy state is substantially resonant with an energy of the well top, **and said barrier layers are sufficiently thick to substantially inhibit carrier tunneling therethrough**;

wherein the materials, thicknesses and dimensions of said well layers and barrier layers are selected such that said quantum well structures effect intersubband transitions at first and second wavelengths, respectively, well layers of one quantum well structure including GaAs and well layers of another quantum well structure including InGaAs, wherein none of said two quantum well structures is short circuited.

3. A QWIP as in claim 1 wherein said two quantum well structures in each photodetector are separated by an intermediate contact layer.

4. A QWIP as in claim 3 wherein said barriers in both quantum well structures are formed of AlxGa1-xAs.

9. The QWIP as in claim 1 further comprising a multiplexer coupled to each photodetector in said array and generating a stream of data caused by radiation at said first wavelength and a stream of data caused by radiation at said second wavelength, so as to separately form images of the first and second wavelengths.

11. A QWIP as in claim 1 further comprising a continuum transport band, carrying a photocurrent from said wells, wherein the continuum transport band has a smooth energy level profile between wells in said two quantum well structures.

12. A QWIP as in claim 11 wherein said barriers in one of said two quantum well structures have a barrier height equal to that of the barriers in the other one of said two quantum well structures.

13. A QWIP as in claim 12 wherein each barrier is formed of a material including aluminum, wherein the aluminum mole ratio is the same for the barriers in both quantum well structures.

14. A photodetector as in claim 1 further comprising a random reflector formed on said substrate to reflect incident radiation to said photodetectors.

15. A QWIP as in claim 1 wherein said barrier layers are made of AlxGa1-xAs, and said second group of wells are formed of AlyGa1-yAs where x is not equal to y.

16. A photodetector as in claim 1 wherein said excited energy state is substantially resonant with an energy of the well top and has a deviation from said well top by less than about 2% of the well top.

17. (**Amended**) A quantum well infrared photodetector comprising:

a substrate formed of a semiconductor material;

a plurality of photodetectors disposed relative to one another to form an array on said substrate, each photodetector formed of alternating quantum wells of a first type and a second type with different active layers [stacking to one another]**, one stacked over the other, each quantum well sandwiched between two barrier layers sufficiently thick to substantially inhibit carrier tunneling therethrough**;

each well having a ground bound state and an excited state energy level approximately equal to a thermionic energy level of said well to effect an intersubband absorption and said quantum wells of said first type including InGaAs and absorbing photons of a first wavelength and said quantum wells of said second type including GaAs and absorbing photons at a second wavelength different from said first wavelength, wherein none of said quantum wells is short circuited.

18. A QWIP as in claim 1 further comprising a continuum energy level between adjacent wells and carrying excited charge carriers, wherein said excited energy state is at a position such that the excited carriers can escape into the continuum by tunneling through less than 50 Å of material.

19. A QWIP as in claim 17, further comprising a random reflector formed on said substrate.

20. A device as in claim 17 wherein the first wavelength is mid-wavelength infrared radiation and the second wavelength is long wavelength infrared radiation.